

That which is claimed is:

5 1. A conductive adhesive composition comprising:
in the range of about 5 up to about 65 % by
volume of a high melting point metal,
in the range of about 5 up to about 60 % by
10 volume of a low melting point metal or metal
alloy,
in the range of about 2 up to about 60 % by
volume of a chemically protected
crosslinking agent,
in the range of 0 up to about 35 % by volume of
a resin,
in the range of 0 up to about 35 % by volume of
a reactive monomer or polymer, and
15 in the range of 0 up to about 10 % by volume of
a metal additive,

with the proviso that said composition must
contain either said resin and/or said reactive monomer or
polymer, or, in the alternative, said resin and/or said
reactive monomer or polymer can be combined with said
20 chemically protected crosslinking agent to produce a single
component of said composition.

2. A conductive adhesive composition according
to claim 1, wherein said composition comprises:
in the range of about 8 up to about 60 % by
volume of a high melting point metal,
5 in the range of about 6 up to about 40 % by
volume of a low melting point metal or metal
alloy,
in the range of about 7 up to about 50 % by
volume of a chemically protected
10 crosslinking agent,
in the range of 0 up to about 12 % by volume of
a resin,

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~~in the range of 0 up to about 28 % by volume of
a reactive monomer or polymer, and
in the range of 0 up to about 5 % by volume of a
metal additive.~~

3. A conductive adhesive composition according to claim 1 wherein said metal additive is present in an amount falling in the range of about 0.1 up to about 5 % by volume.

4. A conductive adhesive composition according to claim 3, wherein the combined volume percent of said high melting point metal, said low melting point metal or metal alloy, and said metal additive falls in the range of
5 about 14 up to about 75 volume percent, based on the total volume of said composition, and wherein
the volume percent of said chemically protected crosslinking agent falls in the range of 5 up to about 55 volume percent,
10 the volume percent of said resin falls in the range of 3 up to about 30 volume percent, and
the volume percent of said reactive monomer or polymer falls in the range of 3 up to about 30 volume percent.

5. A conductive adhesive composition according to claim 1 wherein said resin is present in an amount falling in the range of about 3 up to about 35 % by volume.

6. A conductive adhesive composition according to claim 5, wherein the volume ratio of the combined volume of said resin, and said reactive monomer or polymer, when present, relative to the volume of the chemically protected
5 crosslinking agent, falls in the range of about 0.1 up to about 10.

7. A conductive adhesive composition according to claim 1 wherein said reactive monomer or polymer is present in an amount falling in the range of about 3 up to about 35 % by volume.

8. A conductive adhesive composition according to claim 5, wherein the volume ratio of the combined volume of said reactive monomer or polymer, and said resin, when present, relative to the volume of the chemically protected crosslinking agent, falls in the range of about 0.1 up to about 10.

9. A conductive adhesive composition according to claim 1, wherein said high melting point metal is selected from copper powder, silver powder, aluminum powder, gold powder, platinum powder, palladium powder, beryllium powder, rhodium powder, nickel powder, cobalt powder, iron powder, molybdenum powder, or high-melting point alloys of any two or more of these metals.

10. A conductive adhesive composition according to claim 1, wherein said low melting point metal or metal alloy is any metal or metal alloy having a melting point lower than that of said high melting point metal or metal alloy.

11. A conductive adhesive composition according to claim 10, wherein said low melting point metal or metal alloy is selected from Sn, Bi, Pb, Cd, Zn, Ga, In, Te, Hg, Tl, Sb, Se or Po, or mixtures of any two or more thereof.

12. A conductive adhesive composition according to claim 1, wherein said chemically protected crosslinking agent is a compound bearing one or more functional groups selected from carboxyl, hydroxyl, amine, thiol or cyano groups, or derivatives thereof.

13. A conductive adhesive composition according to claim 1, wherein said chemically protected crosslinking agent is selected from an anhydride, a carboxylic acid, an amide, an imide, an amine, an alcohol, a phenol, an isocyanate, a cyanate ester or a thiol.

14. A conductive adhesive composition according to claim 1, wherein said chemically protected crosslinking agent comprises at least two functionalities selected from anhydride, carboxyl, amine, amide, hydroxyl or cyano.

15. A conductive adhesive composition according to claim 1, wherein said resin is a thermosetting monomer or polymer.

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5 16. A conductive adhesive composition according to claim 1, wherein said resin is selected from an epoxy, a phenolic, a novalac (both phenolic and cresolic), a polyurethane, a polyimide, a maleimide, a cyanate ester, a polyvinyl alcohol, a polyester, a polyurea, an acrylic, a polyamide, a polyacrylate, a polysiloxane or a cyanoacrylates.

17. A conductive adhesive composition according to claim 1, wherein said resin is selected from an epoxy, a phenolic, a novalac (both phenolic and cresolic), a polyimide, a maleimide, a cyanate ester, a polyester, a polyamide or polysiloxanes.

18. A conductive adhesive composition according to claim 1, wherein said reactive monomer or polymer contains at least one functional group.

19. A conductive adhesive composition according to claim 1, wherein said reactive monomer or polymer contains one or more functional groups selected from epoxides, amides, amines, alcohols, allyls, acrylates, 5 methacrylates, cyanate esters or maleimides.

20. A conductive adhesive composition according to claim 1, wherein said metal additive is selected from boron, aluminum, chromium, iron, nickel, zinc, gallium, silver, palladium, platinum, gold, indium, antimony, 5 bismuth, tellurium, manganese, phosphorous, cobalt or copper.

21. A method of attaching a discrete electronic component to an electrical interconnect substrate, said method comprising:

- 5 (i) depositing a conductive adhesive composition according to claim 1 onto an electrical interconnect substrate in a desired pattern,
- (ii) placing discrete electronic components into said conductive adhesive composition, and
- 10 (iii) subjecting said conductive adhesive composition to conditions suitable to afford an electrically conductive joint between the discrete electronic component and the electrical interconnect substrate.

22. A method according to claim 21 wherein:

said composition is partially cured after application onto substrate, but prior to the sintering cycle,

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post-cure of said composition is carried out separately from the sintering cycle, and/or the thermal requirements for processing of said composition are reduced by conducting the sintering cycle under pressure.

23. An article prepared according to the method of claim 21.